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(54) **LANYARD ATTACHMENT ASSEMBLY**

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A44B 13/00	(2006.01)
A44B 13/02	(2006.01)

(52) **U.S. Cl.**

CPC ***A45F 5/00*** (2013.01); ***A44B 13/0058*** (2013.01); ***A44B 13/02*** (2013.01); *A45F 2005/006* (2013.01); *A45F 2200/0575* (2013.01); *Y10T 24/1394* (2015.01); *Y10T 24/1397* (2015.01)

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USPC ..... 24/3.1, 3.12, 3.13, 298, 299, 300, 301, 24/302, 265 AL

See application file for complete search history.

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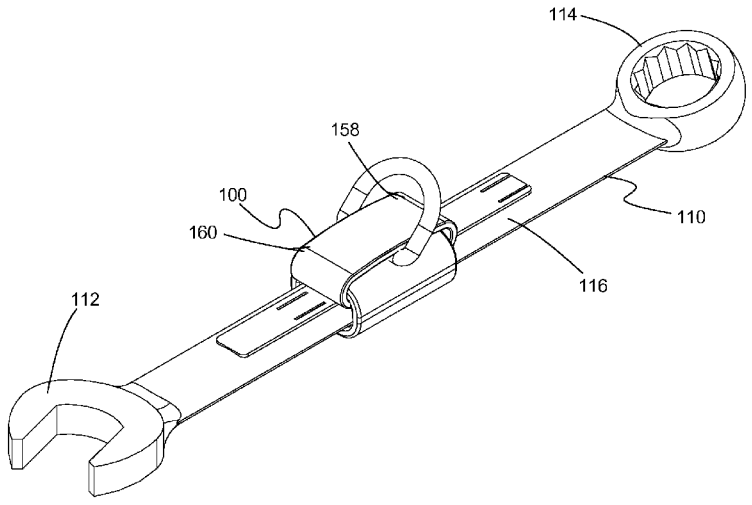
(57) **ABSTRACT**

A lanyard attachment assembly has a sleeve with an inside surface and an outside surface. The inside surface defines a passageway through the sleeve. A strap passes through the passageway and forms a closed loop to link the closed loop to the sleeve. The assembly optionally includes a connector with a connector opening therethrough. When the assembly includes a connector, the strap passes through the connector opening where the closed loop links the connector to the sleeve.

14 Claims, 7 Drawing Sheets



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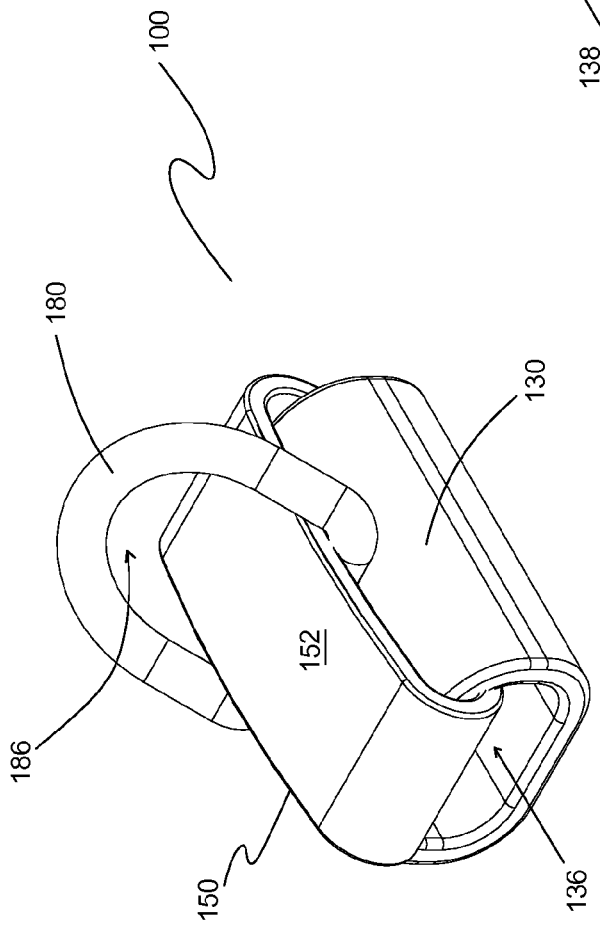

Fig. 1

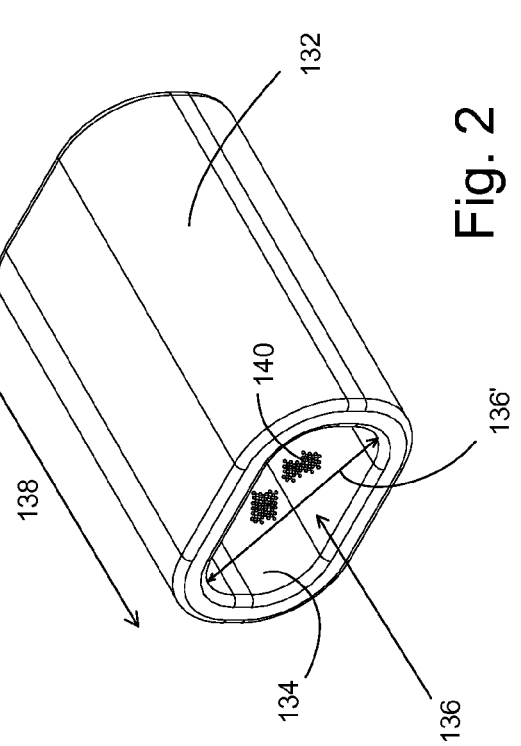

Fig. 2

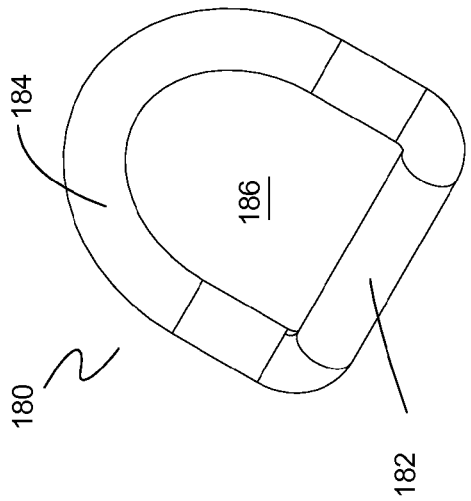

Fig. 3

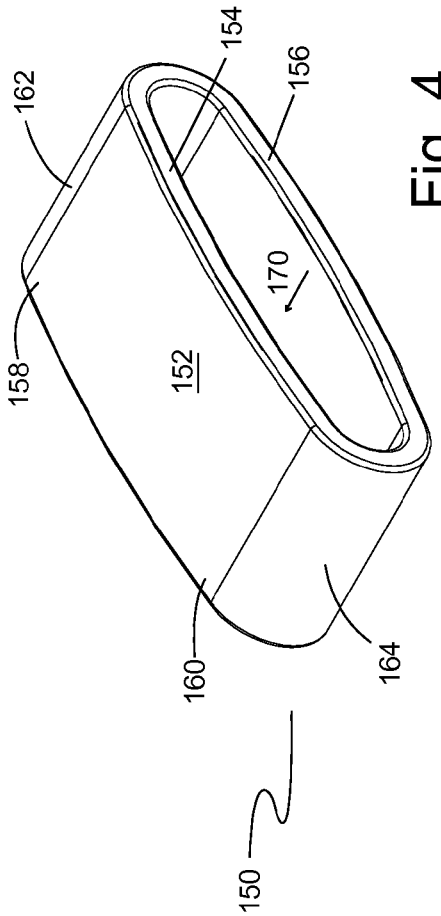

Fig. 4

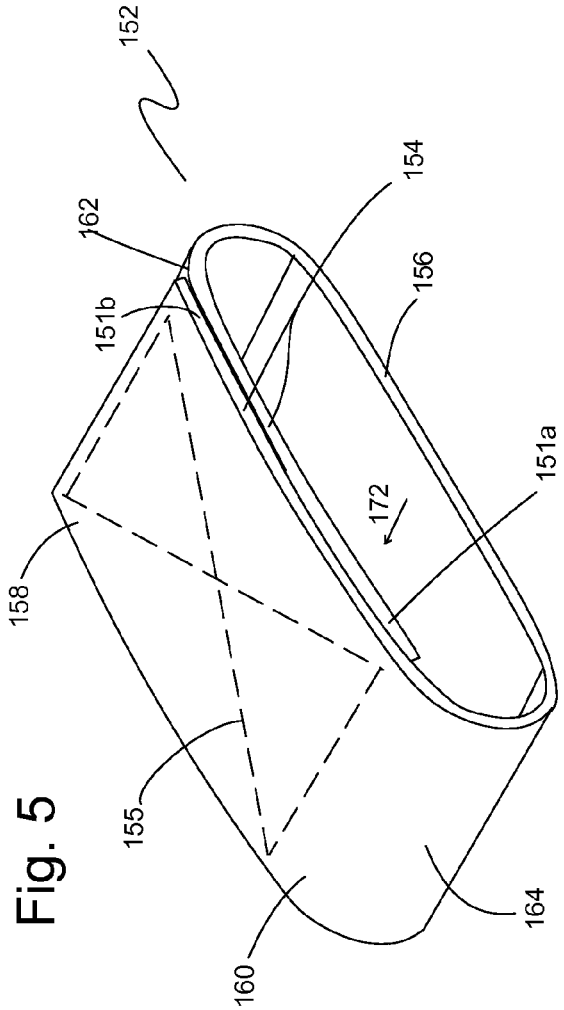
152
162
154
151b
156
158
172
151a
155
164
160

Fig. 5

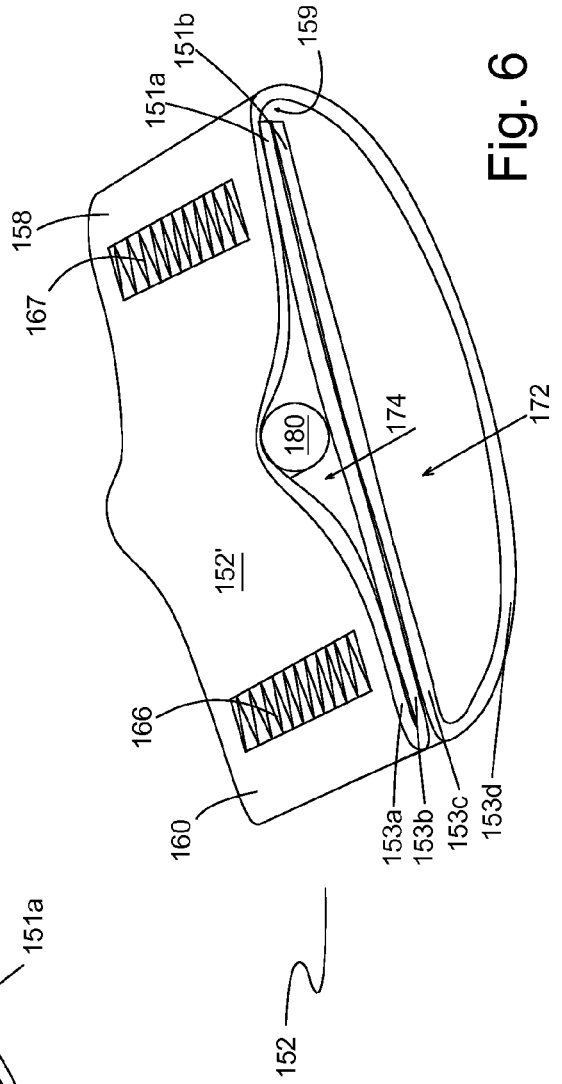
151b
159
151a
158
167
180
174
172
152'
166
160
153a
153b
153c
153d
152

Fig. 6

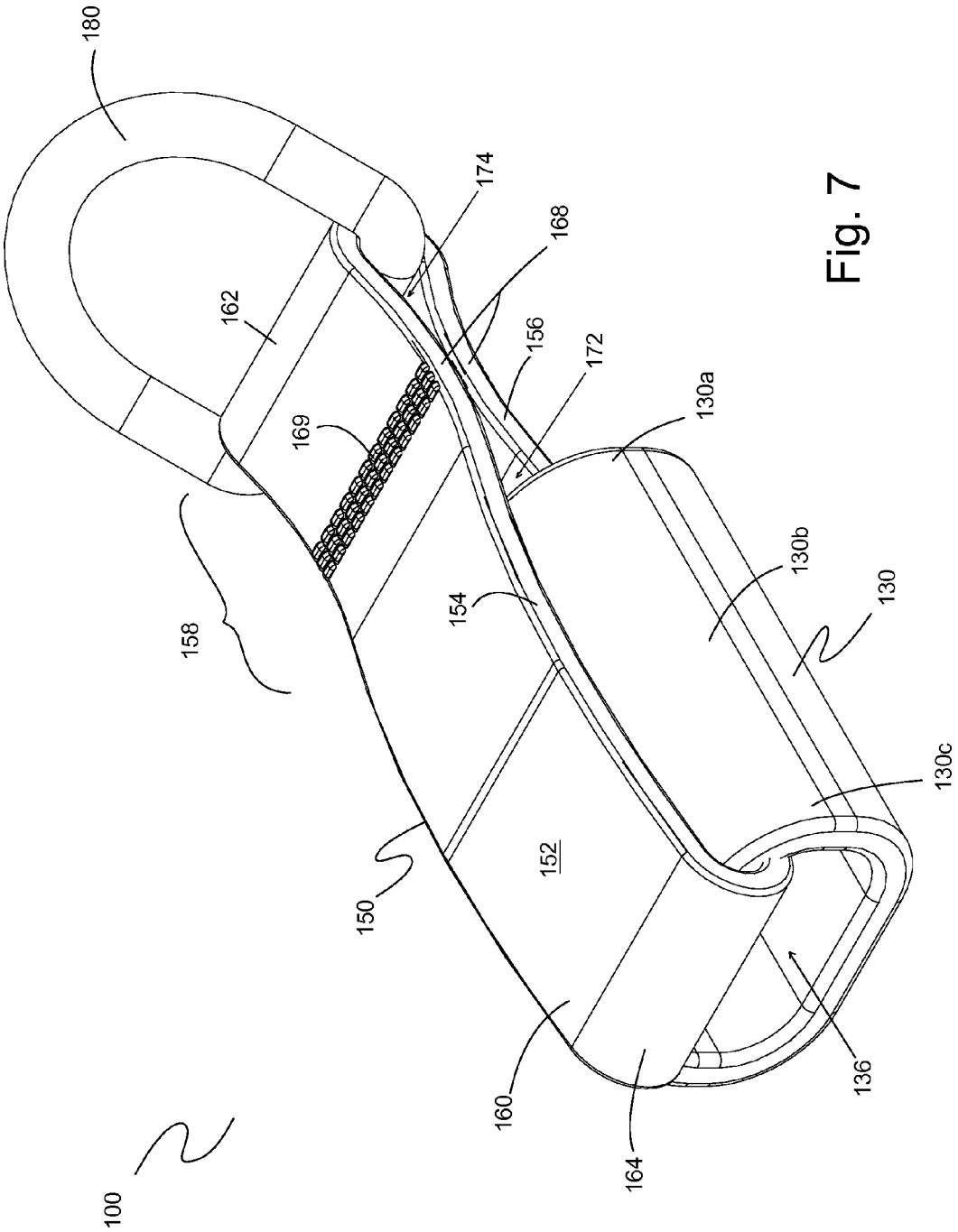
180
174
168
162
156
172
130a
169
130b
130
154
158
130c
152
150
136
160
164
100

Fig. 7

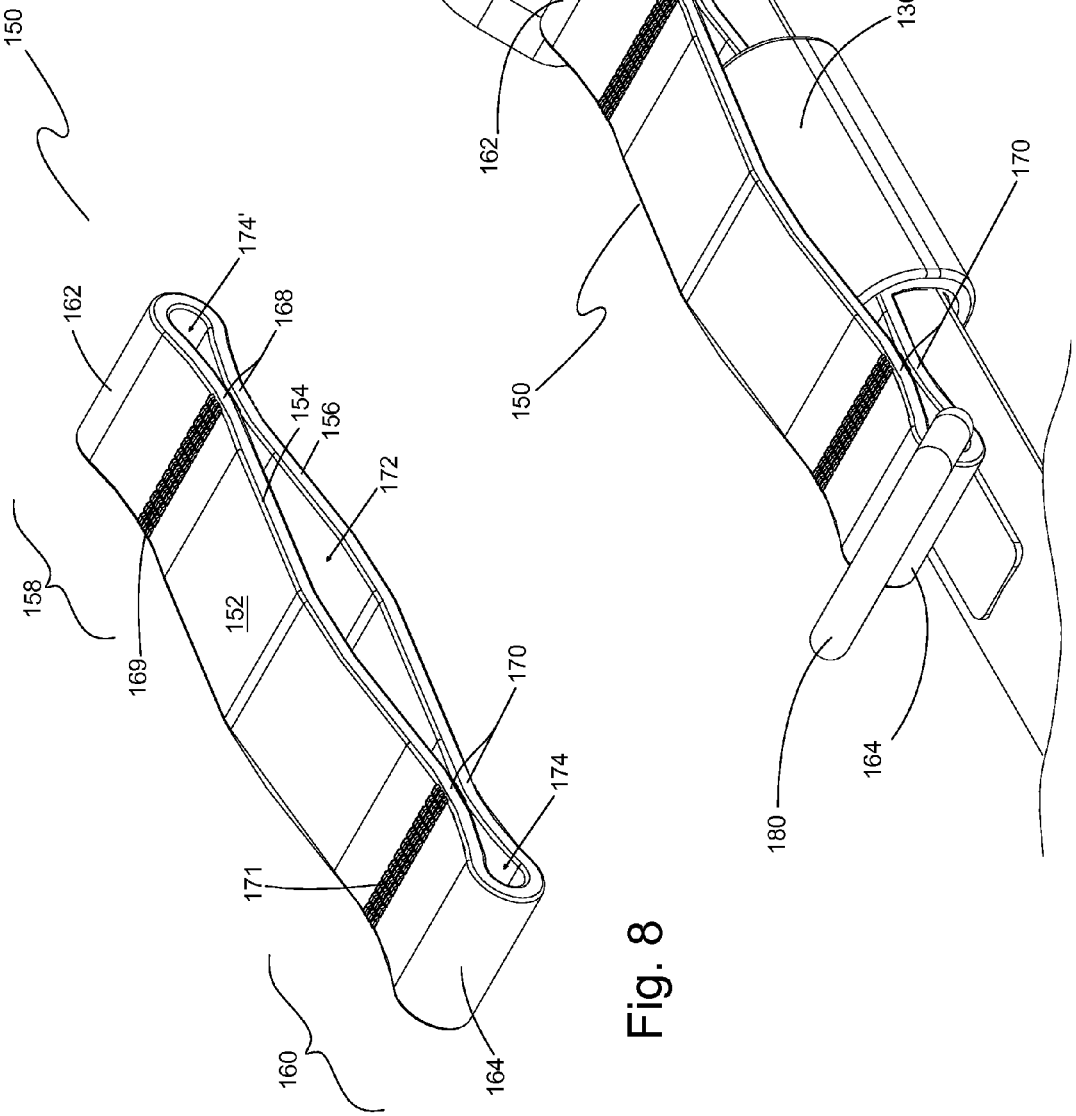
150
174'
162
168
154
156
172
158
152
169
170
174
171
160
164
180
110
168
130
162
170
150
164
180

Fig. 8

Fig. 9

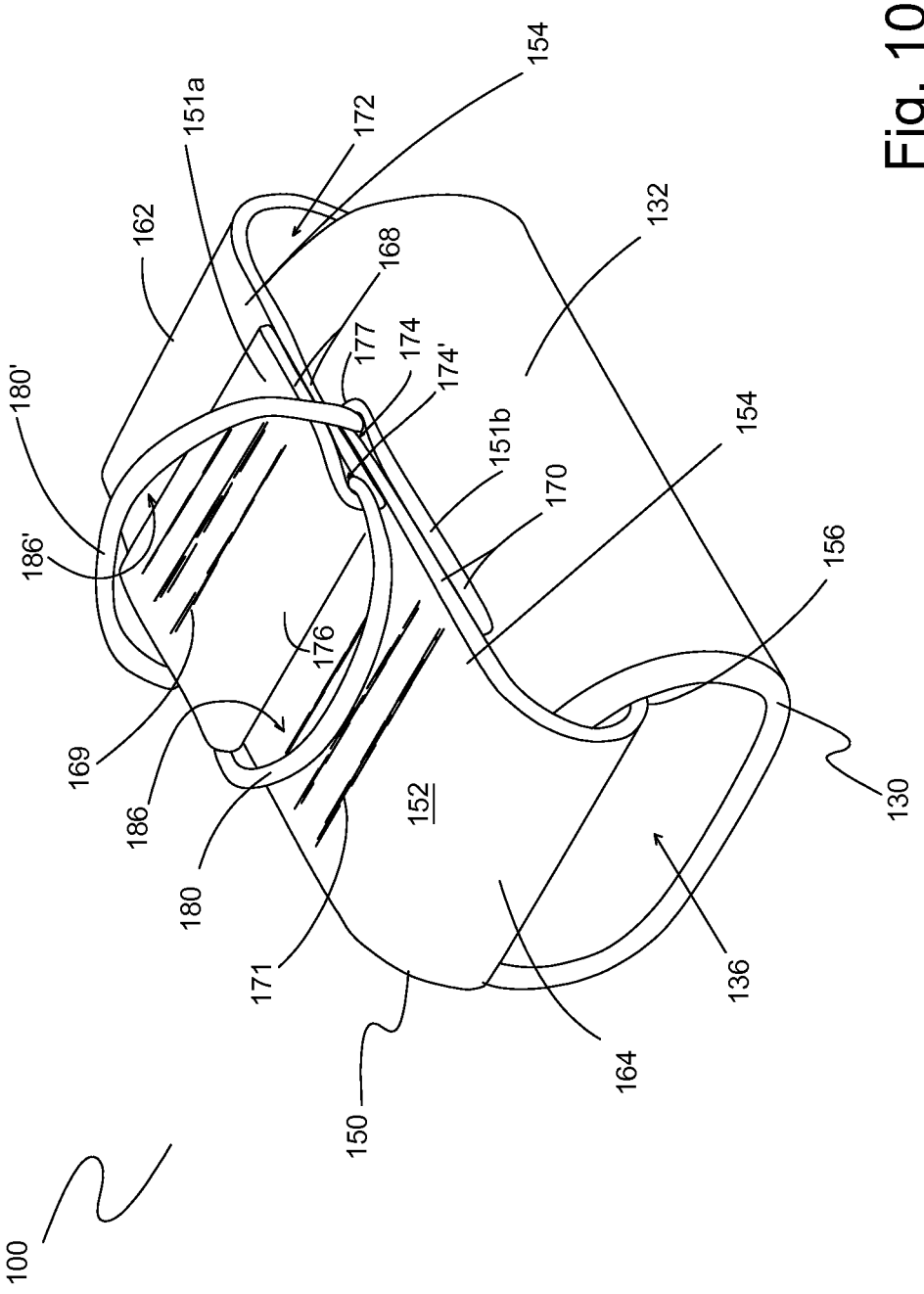
100
150
164
136
171
180
186
169
186'
180'
162
151a
172
154
132
168
177
174
174'
151b
170
154
156
130
176
152

Fig. 10

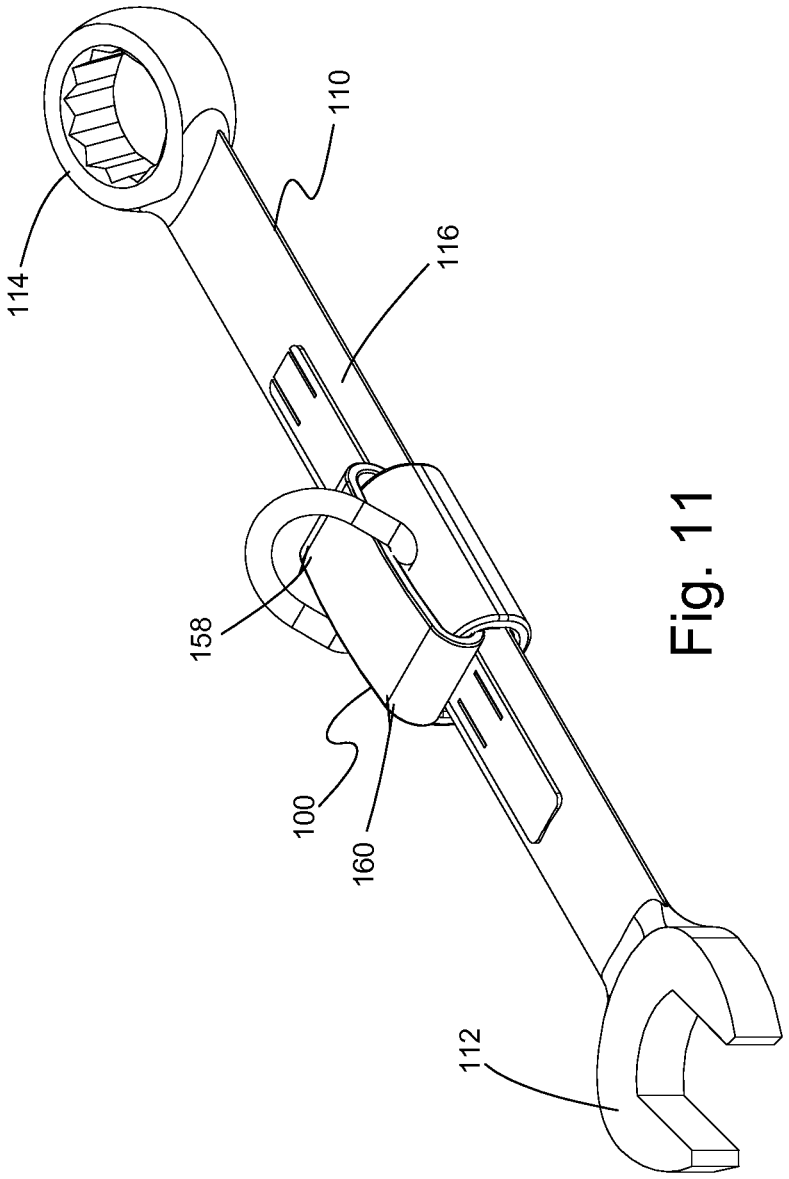

Fig. 11

LANYARD ATTACHMENT ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to hand tools and accessories. More particularly, the present invention relates to a lanyard attachment assembly for hand tools and other objects.

2. Description of the Prior Art

Hand tools are widely used in construction, maintenance, and industrial facilities operations. The user of a tool often stores tools in a bag, box, pouch, or tool belt when the tool is not being used. The user then selects the appropriate tool for a given task and returns the tool to its storage location after the task is complete. For tasks performed at elevated heights, dropping a tool can cause injury to individuals or damage to objects below the worker. The dropped tool also is a significant inconvenience for workers who must spend time to retrieve the dropped tool.

Tool makers have partially addressed the problem of dropped tools by attaching a ring to a tool by connecting the ring through an opening in the end of the tool handle. For example, a metal ring passes through an opening in the end of a handle of a hammer or pipe wrench. Another method of addressing this problem is to attach a ring or grommet to the tool by forming a sleeve over the end of the tool's handle or grip where the sleeve has a solid end with an opening in the solid end. For example, one line of tools includes hammers, hinged pliers, and adjustable spanners that have a rubber sleeve formed over the grip of the tool with a solid end portion of the sleeve extending beyond the end of the grip. A ring passes through an opening or grommet in the solid end of the rubber sleeve. The user clips one end of a lanyard to the ring and attaches the other end of the lanyard to the user's tool belt, scaffolding, ladder, or other object.

Another method of addressing the problem of dropped tools is a lanyard attachment assembly that includes a connector attached to a leader. The leader is a generally-flat strip of material that is secured to a tool by heat shrink tubing slipped over both the tool and the leader. The heat shrink tubing is subsequently heated, thereby shrinking the tubing to provide a snug fit over the leader and securing the leader to the tool.

SUMMARY OF THE INVENTION

One limitation of currently-available tool lanyard attachment methods is that some methods rely on the tool having an unused or free end of the handle to which a rubber sleeve or ring may be attached. This design is not useful, however, for two-ended tools with functional features on each end of the tool. A combination wrench, for example, has one open end and one box end to provide dual functionality. Attaching a ring by using a sleeve formed over either end of the combination wrench renders that end of the wrench useless for its intended use. Similarly, connecting a ring through the box-end of a wrench renders that end useless for turning bolts because the ring is in the way of the bolt head.

One limitation of lanyard attachment assemblies that include a leader secured to the tool with heat shrink tubing is that this design has proven unreliable. The assembly fails because the leader may be inadvertently pulled out from the heat shrink tubing.

Therefore, what is needed is an improved lanyard attachment assembly for hand tools and other objects.

It is an object of the present invention to provide a lanyard attachment that reinforces safety.

It is also an object of the present invention to provide a lanyard attachment that increases productivity.

It is also an object of the present invention to provide a lanyard attachment that reduces operating costs.

It is also an object of the present invention to improve reliability of lanyard attachment assemblies.

The present invention achieves these and other objectives by providing a lanyard attachment assembly having a sleeve, a strap forming a closed loop, and an optional connector. In one embodiment of the present invention, the lanyard attachment assembly has a sleeve with an inside surface and an outside surface. The inside surface of the sleeve defines a passageway through the sleeve. The assembly also has a strap forming a closed loop that passes through the passageway of the sleeve, thereby linking the strap to the sleeve.

In another embodiment of the present invention, the lanyard attachment assembly has a connector with an opening through the connector. In this embodiment, the strap also passes through the connector opening, linking the sleeve to the connector.

In another embodiment of the present invention, the closed loop has a first end portion and an opposite second end portion. The closed loop also has a first strap portion and a second strap portion that is aligned with and opposed to the first strap portion. The first strap portion and the second strap portion each extend between the first end portion and the second end portion. The first end portion of the closed loop includes a first turn between the first strap portion and the second strap portion. The second end portion of the closed loop includes a second turn between the first strap portion and the second strap portion.

In another embodiment of the present invention, one or both of the first turn and the second turn is configured so that the strap folds back on itself and the first strap portion is secured to the second strap portion at a connection point to define one or more additional strap openings. In another embodiment of the present invention, the first strap portion is connected to the second strap portion at the connection point by stitching, an adhesive, a closed loop encircling the connection point, one or more staples, one or more clips, one or more crimp bands, one or more clamps, or a combination of these devices.

In another embodiment of the present invention, the assembly has a plurality of connectors. In one embodiment, the plurality of connectors includes a first connector and a second connector. A first strap end of the strap folds back at a first fold onto the strap and is connected to the strap at a first connection point to define a secondary opening through which passes a portion of the first connector. A second strap end of the strap folds back at a second fold onto the strap and is connected to the strap at a second connection point to define an additional secondary opening through which passes a portion of the second connector. A closed loop is formed by the first fold passing through the opening of the second connector to overlap the second fold or by the second fold passing through the opening of the first connector to overlap the first fold.

In another embodiment of the present invention, the sleeve is heat shrink tubing having a shrink ratio preferably between about 2:1 and about 4:1.

In another embodiment of the present invention, the assembly has an adhesive disposed on the inside surface of the sleeve. The adhesive in one embodiment is heat-activated.

In another embodiment of the present invention, the connector is a D-ring, an O-ring, a carabiner, a shackle, split ring, a tri-loop, an open ring, a loop, a hook, or a snap hook.

In another embodiment of the present invention, the strap is made of polymeric material, metal, or a combination of these materials.

In one method of making a lanyard attachment assembly, a length of strap having a first strap end and second strap end is selected. The first strap end or the second strap end is passed through the passageway of the sleeve. The first strap end or the second strap end also passes through the connector opening of one or more connectors. The first strap end is then positioned to overlap the second strap end and the overlapping portion of the strap is fixedly secured with one or more fastening means to form a closed loop with a primary opening therethrough. The resulting assembly includes a sleeve linked to a connector by a strap forming a closed loop.

Optionally, the first strap portion and the second strap portion are fixedly secured together at connection points with fastening means to define one or more fastener receiving openings or secondary openings. In another embodiment of making the lanyard attachment assembly, the connector is not included, in which case the assembly includes a sleeve linked to a strap forming a closed loop. In a preferred embodiment of a method of making a lanyard attachment assembly, the sleeve is heat shrink tubing, the strap is woven nylon webbing, and the connector(s) is (are) a metal D-ring.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a perspective view of one embodiment of a lanyard attachment assembly of the present invention showing a sleeve, a strap, and an optional connector.

FIG. **2** illustrates one embodiment of a sleeve of the present invention.

FIG. **3** illustrates one embodiment of a connector of the present invention showing a D-ring.

FIG. **4** illustrates one embodiment of a strap of the present invention.

FIG. **5** illustrates another embodiment of a strap of the present invention showing overlapped end portions of the strap fixedly bound to each other.

FIG. **6** illustrates another embodiment of a strap of the present invention showing overlapped end portions where one end portion also overlaps on itself to form a connector receiving opening.

FIG. **7** illustrates another embodiment of a strap of the present invention with a connector and sleeve showing a connection receiving opening and a strap connection point.

FIG. **8** illustrates another embodiment of a strap of the present invention showing a secondary opening and an additional strap connection point.

FIG. **9** illustrates the strap of FIG. **9** used as part of a lanyard attachment assembly installed on a hand tool.

FIG. **10** illustrates a further embodiment of a strap as part of a lanyard attachment assembly of the present invention showing multiple connectors.

FIG. **11** illustrates a perspective view of the embodiment of FIG. **1** installed on a hand tool.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiments of the present invention are illustrated in FIGS. **1-11**. FIG. **1** illustrates a perspective view of one embodiment of a lanyard attachment assembly **100** having a sleeve **130**, a strap **150**, and an optional connector **180**. Strap **150** passes through passageway **136** of sleeve **150** and through opening **186** of connector **180**. Strap **150** is fixedly secured to itself, forming a closed loop **152** and linking sleeve **130** to connector **180**.

FIG. **2** illustrates an embodiment of sleeve **130** as shown in lanyard attachment assembly **100** of FIG. **1**. Sleeve **130** is preferably a length of plastic or rubber tubing that has an outside surface **132** and an inside surface **134**. Inside surface **134** defines a passageway **136** extending longitudinally through sleeve **130**; inside surface **134** corresponds to inside diameter **136'** of sleeve **130**. Sleeve **130** preferably has a length **138** between 1.5 inches and 4 inches, but is not limited to these lengths. Sleeve **130** optionally has adhesive **140** disposed on inside surface **134** of sleeve **130**. In one embodiment, adhesive **140** is heat activated, but other adhesives **140** are acceptable and include, for example, air-cured adhesives, chemically-activated adhesives, anaerobic adhesives, cyanoacrylate adhesives, pressure-sensitive adhesives, epoxies, and various other adhesives.

In one embodiment, sleeve **130** is made of extruded thermoplastic heat shrink tubing. Sleeve **130** is mechanically expanded after extrusion where inside diameter **136'** represents the sleeve's expanded state. When heated, sleeve **130** is capable of returning to its relaxed state with a smaller inside diameter **136'**. Heat shrink tubing is commonly made of polyolefin, fluoropolymers, nylon, PVC, silicon elastomer, neoprene, or a fluoropolymer elastomer, such as the fluoropolymer elastomer made by DuPont under the name Viton™. The ratio of the heat shrink tubing's inside diameter **136'** in its expanded state to its inside diameter **136'** in its relaxed state is known as the shrink ratio. The shrink ratio can be 6:1 or greater in some shrink tubing. Preferably, the shrink ratio for sleeve **130** is 4:1, 3:1, or 2:1, but this ratio is selected based on the difference in size between the tool's ends **112**, **114** and the portion of tool **110** where lanyard attachment assembly **100** is to be installed, such as the handle or middle portion **116** of tool **110**. For example, a smaller shrink ratio can be used with a hex wrench, which has ends **112**, **114** that are substantially identical in size to the handle or middle portion **116** between ends **112**, **114**. In contrast, for a combination wrench, a larger shrink ratio would be appropriate due to the difference in overall size between middle portion **116** and first or second ends **112**, **114**.

In another embodiment, sleeve **130** is made of rubber. Sleeve **130** preferably has inside diameter **136'** corresponding to a sleeve circumference that is smaller than the circumference of the portion of tool **110** where sleeve **130** is to be installed. The elastic properties of sleeve **130** are sufficient for inner diameter **136'** of sleeve to be expanded (e.g., stretched) so sleeve **130** passes over at least one of ends **112**, **114** of tool **110** and positioned over the tool's handle, middle portion **116**, or other part. Sleeve **130** then is allowed to resume its relaxed state to the extent possible to create a snug fit to tool **110**.

FIG. **3** shows one embodiment of connector **180** with opening **186** through connector **180**. Connector is preferably a metal D-ring having a straight section **182** connected across a U-shaped section **184**. Connector may be any other closed or partially-closed connector including an O-ring, a carabiner, a shackle, split ring, a tri-loop, an open ring, a loop, a snap hook, a spring clip, or a spring buckle. Connector **180** in some embodiments has multiple openings **186**, such as some buckle clips, for example. Connector **180** may be made of any material suitable for the user's desired strength, durability, and weight requirements. Materials for connector **180** include, for example, steel, aluminum, metal alloys, rubber, cloth, rope, plastic, reinforced composites, wire, and the like.

FIG. **4** illustrates one embodiment of strap **150** as shown in the embodiment illustrated in FIG. **1**. Strap **150** is preferably

nylon webbing, but strap **150** may be made of other woven, non-woven, knitted, braided, or solid materials including, but not limited to rubber, cloth, metal, and plastic. In some embodiments, strap **150** is made of knitted, woven, or braided elastic webbing that is capable or stretching 25%, 50%, 75%, 100%, or more of its original, unstretched length.

Strap **150** forms a closed loop **152** having a first end portion **158** and a second end portion **160**. Closed loop **152** also has a first strap portion **154** and a second strap portion **156** generally aligned with and opposing first strap portion **154**. First strap portion **154** and second strap portion **156** each extend between first end portion **158** and second end portion **160**. First end portion **158** of closed loop **152** includes a first fold or first turn **162** between first strap portion **154** and second strap portion **156**; second end portion **160** includes a second fold or second turn **164** between first strap portion **154** and second strap portion **156**.

FIG. **5** illustrates another embodiment of closed loop **152** of strap **150**. In this embodiment, strap **150** has a first strap end **151***a* and a second strap end **151***b*. First strap end **151***a* overlaps in an opposed direction and is fixedly secured to second strap end **151***b*, forming closed loop **152**. Closed loop **152** defines primary opening **172** therethrough. Overlapping portions of first strap end **151***a* and second strap end **151***b* are fixedly secured together with one or more fastening means **155**. Fastening means **155** is preferably stitching. Other acceptable fastening means **155** include, for example, a rivet, a staple, a clip, adhesive, fusion, and the like.

Optionally, closed loop **152** is seamless and continuous where an open connector **180** (not shown) and open sleeve **130** (not shown) is passed through primary opening **172** and subsequently closed to link sleeve **130**, strap **150**, and connector **180**. For example, connector **180** is convertible between an open position and a closed position (e.g., a split ring or carabiner). Connector **180** is passed through primary opening **172** in its open position and is then converted to its closed position to link connector **180** to closed loop **152**. Similarly, a strip of rubber or neoprene, for example, may be closed or seamed together after passing it through primary opening **172** of closed loop **152**, forming sleeve **130** and linking it to closed loop **152**.

FIG. **6** illustrates another embodiment of strap **150**. In this embodiment, strap **150** forms a multi-layered closed loop **152'** where first strap end **151***a* and second strap end **151***b* each fold towards a middle location **159** of strap **150**. Strap **150** is then folded again at or near middle location **159** with first strap end **151***a* and second strap end **151***b* positioned on the inside of the fold and extending in the same direction. The resulting structure is a closed loop **152'** with overlapping layers **153***a*-**153***d* and defining primary opening **172** and one or more connector receiving openings or secondary openings **174** between layers of closed loop **152'**.

First strap end **151***a* and second strap end **151***b* preferably occupy middle layer **153***b* and second middle layer **153***c*, respectively. Portions of strap **150** between first strap end **151***a* and second strap end **151***b* occupy first layer **153***a* and end layer **153***d*. Fastening means **166**, **167** secure together first layer **153***a*, middle layer **153***b* (first strap end **151***a*), and second middle layer **153***c* (second strap end **151***b*) at spaced-apart locations. Fastening means **166**, **167** are preferably stitching, but other fastening means may be used as described above. Closed loop **152'** has primary opening **172** between second middle layer **153***c* and end layer **153***d*. Closed loop **152'** has a connector receiving opening or secondary opening **174** between first layer **153***a* and middle layer **153***b*. A portion of sleeve **130** passes through primary opening **172** between second middle layer **153***c* and end layer **153***d* to link together strap **150** and sleeve **130**. A portion of connector **180** (e.g., straight section **182** of a D-ring) passes through secondary opening **174** between first layer **153***a* and middle layer **153***b* to link together strap **150** and connector **180**.

Optionally, only second strap end **151***b* folds towards middle location **159** of strap **150** and strap **150** is then folded at or near middle location **159** towards first end **151***a*. The resulting closed loop **152'** includes first layer **153***a* (first strap end **151***a*), but omits middle layer **153***b*. Closed loop **152'** also includes second middle layer **153***c* (second strap end **151***b*) and end layer **153***d* (the portion of strap **150** between first strap end **151***a* and second strap end **151***b*). First strap end **151***a* preferably terminates towards one end of closed loop **152'** (e.g., second end portion **160**) adjacent fastening means **166**, while second strap end **151***b* terminates towards the opposite end of closed loop **152'** (e.g., first end portion **158**) adjacent fastening means **167**. First strap end **151***a* optionally extends beyond second end **160** of closed loop **152'** and may wrap around the outside of closed loop **152'** along end layer **153***d* towards first end portion **158**.

FIG. **7** illustrates another embodiment of strap **150** as part of lanyard attachment assembly **100** with sleeve **130** and optional connector **180**. In this embodiment, strap **150** forms a closed loop **152** that defines a primary opening **172** and a secondary opening **174** through closed loop **152**. Forming primary opening **172** and secondary opening **174**, fastening means **169** secures first strap portion **154** to second strap portion **156** at a first strap connection point **168** that is positioned between first turn **162** and second turn **164**. Fastening means **169** is preferably stitching and may be replaced or supplemented by one or more other fastening means as described above. A portion of sleeve **130** passes through primary opening **172** to link sleeve **130** to strap **150**. A portion of connector **180** passes through secondary opening **174** of closed loop **152**, linking connector **180** to strap **150**. Thus, sleeve **130**, strap **150**, and connector **180** are linked together.

First end portion **158** of closed loop **152** includes first turn **162**, fastening means **169**, secondary opening **174**, and portions of first strap portion **154** and second strap portion **156** that are positioned between fastening means **169** and first turn **162**. First end portion **158** in one embodiment is positioned to extend from a first sleeve end **130***a* away from sleeve **130** so as to lay flat along an adjacent handle or middle portion of a tool. Alternately, first end portion **158** may be positioned over a middle sleeve portion **130***b* so as to extend transversely away from middle sleeve portion **130***b* and, when installed on a tool **110**, in a transverse direction away from the handle or middle portion of tool. For example, first end portion **158** is positioned over sleeve **130** by rotating closed loop **152** about sleeve **130** by approximately 90 degrees (as compared with the position shown in FIG. **7**, which is considered to be in a 0-degree position). Rotating closed loop **152** about sleeve **130** in order to position first end portion **158** as desired is facilitated by making strap **150** of a flexible strap material that conforms to the shape of sleeve **130** as needed. Flexible strap materials include, for example, woven nylon, cotton, woven or non-woven fabrics, and polypropylene strapping.

FIG. **8** illustrates a further embodiment of strap **150**. First end portion **158** of closed loop **152** includes a first strap connection point **168** where first strap portion **154** and second strap portion **156** are fixedly secured together by fastening means **169** as described above. Similarly, second end portion **160** includes a second strap connection point **170** where first strap portion **154** and second strap portion **156** are also fixedly secured together by fastening means **171** as described above. Fastening means **169**, **170** are preferably stitching.

By including strap connection points **168**, **170**, strap **150** forms closed loop **152** that defines primary opening **172**, secondary opening **174**, and an additional secondary opening **174'**, each of which pass between first and second strap portions **154**, **156** of closed loop **152**. Primary opening **172** is defined between first strap portion **154**, second strap portion **156**, first strap connection point **168**, and second strap connection point **170**. Secondary opening **174** is defined between first strap connection point **168**, first turn **162**, and portions of first and second strap portions **154**, **156** that are between first strap connection point **168** and first turn **162**. Similarly, additional secondary opening **174'** is defined between second strap connection point **170**, second turn **164**, and portions of first and second strap portions **154**, **156** that are between second strap connection point **170** and second turn **164**. More additional secondary openings **174'** may be similarly created by adding more strap connection points to closed loop **152**.

FIG. **9** shows the embodiment of strap **150** shown in FIG. **8** installed on a hand tool **110** as part of lanyard attachment assembly **100** with sleeve **130** and connector **180**. Sleeve **130** passes through primary opening **172** to link sleeve **130** to strap **150**; connector **180** passes through secondary opening **174** to link connector **180** to strap **150**. Lanyard attachment assembly **100** may have one or more connectors **180** passing through any or all of primary opening **172**, secondary opening **174**, and additional secondary opening(s) **174'**. First and second strap connection points **168**, **170** may be spaced from sleeve **130** for ease of assembly.

FIG. **10** illustrates a further embodiment of strap **150** as part of lanyard attachment assembly **100** with sleeve **130** and connectors **180**, **180'**. In this embodiment, strap **150** extends through sleeve **130** and has first strap end **151***a* and second strap end **151***b*. Secondary opening **174** is formed by folding strap **150** to create a first fold **176**, where first strap end **151***a* extends a predefined distance sufficient to form first connection point **168** defined by first strap end **151***a* and a portion of strap **150**. First strap end **151***a* is fixedly attached at a first connection point **168** to a portion of strap **150** by fastening means **169**, preferably by stitching.

Similarly, additional secondary opening **174'** is formed by folding strap **150** to create a second fold **177** where second strap end **151***b* extends a predefined distance sufficient to form second connection point **170** defined by second strap end **151***b* and a portion of strap **150**. Second strap end **151***b* is fixedly attached at a second connection point to a portion of strap **150** by fastening means **171**, also preferably stitching. Additional secondary opening **174'** is defined between second fold **177**, strap **150**, second strap end **151***b*, and second connection point **170**. Strap **150** makes first turn **162** and second turn **164** so that first fold **176** overlaps second fold **177** and forms closed loop **152**.

A portion of connector **180** (e.g., the straight section **182** of a D-ring) passes through secondary opening **174**. A portion of an additional connector **180'** (e.g., the straight section **182** of a D-ring) passes through additional secondary opening **174'**. As assembled, first fold **176** pass through opening **186'** of additional connector **180'** to secure connector **180** and overlap second fold **177**, interlocking strap **150** with connector **180** and additional connector **180'**. Connector **180** is preferably the same size or larger than additional connector **180'** (in overall size or width) to prevent connector **180** from pulling though opening **186'** of additional connector **180'** and to prevent closed loop **152** from coming apart. Alternately, and second fold **177** could similarly pass through opening **186** of connector **180** to secure additional connector **180'** and overlap first fold **176**. Here, additional connector **180'** is preferably the same size or larger than connector **180** to prevent additional connector **180'** from pulling through connector **180**. Preferably, connector **180** and additional connector **180'** are D-rings, but other connectors may be used as described above.

In this embodiment, first strap portion **154** includes portions of strap **150** that pass along outside surface **132** of sleeve **130**, first strap end **151***a*, and second strap end **151***b*, all of which are preferably positioned outside of sleeve **180** between first turn **162** and second turn **164** as shown in FIG. **10**. Second strap portion **156** is the opposing portion of strap **150** that passes through passageway **136** of sleeve **130** between first turn **162** and second turn **164** as also shown in FIG. **10**.

FIG. **11** illustrates the embodiment of lanyard attachment assembly **100** shown in FIG. **1** installed on a hand tool **110**. Lanyard attachment assembly **100** is secured to tool **110** by forming a snug fit to a handle or middle portion **116**. Tool **110** is a combination wrench, but lanyard attachment assembly may be used with other tools and objects including, for example, screwdrivers, utility knives, adjustable wrenches, hex wrenches, channel locks, pliers, punches, ratchet wrenches, flashlights, chisels, and the like.

Tool **110** has a first end **112** (e.g., an open end of a combination wrench), a second end **114** (e.g., a box end of a combination wrench), and a handle or middle portion **116** extending between first end **112** and second end **114**. Lanyard attachment assembly **100** is particularly useful for tools having two functioning ends but either or both of first end **112** and second end **114** may be a featureless end of handle or middle portion **116**. Thus, lanyard attachment assembly **100** is not limited for use with tools and could be used, for example, on a rod, block, or an irregular object. In one embodiment of lanyard attachment assembly **100**, strap **100** is configured with sufficient slack around sleeve **130** to enable connector **180** to move along closed loop **152** between first end portion **158** and second end portion **160**.

In one method of making lanyard attachment assembly **100**, one selects a length of strap **150** having a first strap end **151***a* and second strap end **151***b*. One of the first strap end **151***a* or second strap end **151***b* is passed through passageway **136** of sleeve **130**. One of the first strap end **151***a* and the second strap end **151***b* is optionally also passed through opening **186** of one or more connectors **180**. First strap end **151***a* is then positioned to overlap second strap end **151***b* and the overlapping portion of strap **150** is fixedly secured with one or more fastening means to form a closed loop **152** with a primary opening **172** therethrough. The resulting assembly includes a strap **150** forming a closed loop **152***a* that links sleeve **130** to connector **180**.

Strap **150** is optionally secured to itself at connection points with fastening means to define one or more fastener receiving openings or secondary openings **174**. In another embodiment of making lanyard attachment assembly **100**, the connector is not included, in which case lanyard attachment assembly **100** includes a sleeve **130** linked to a strap **150** forming a closed loop. In preferred embodiments of a method of making lanyard attachment assembly **100**, sleeve **130** is heat shrink tubing, strap **150** is woven nylon webbing, and connector **180** is a metal D-ring.

To use lanyard attachment assembly **100**, a user slips sleeve **130** over an end of hand tool **110** or other object. When sleeve **130** is made of rubber and sized to snugly fit to tool **110**, the user first stretches or otherwise expands sleeve **130** so that it will pass over an end of tool **110** and then allows sleeve **130** to resume its relaxed shape as much as possible to provide a snug fit to tool **110**. When sleeve **130** is made of heat shrink tubing, inside diameter **136'** of sleeve **130** is sized to slip over

an end of tool **110** or other object. The heat shrink tubing is selected with a shrink ratio that provides a snug fit to hand tool **110** when the heat shrink tubing is subsequently heated after placement onto hand tool **110**. For example, the user slips sleeve **130** over the box end of a combination wrench and positions lanyard attachment assembly **100** along the middle portion **116** of the combination wrench. The user then heats the heat shrink tubing until it shrinks to provide a snug grip around the middle portion **116** of the wrench. When heat-activated adhesive **140** is present, heating activates adhesive **140** to bond sleeve **130** to tool **110** that, in addition to the snug grip on hand tool **110**, provides additional gripping strength to hold lanyard attachment assembly **100** in place. Similarly, other varieties of adhesive **140** would also provide additional gripping strength to hold lanyard attachment assembly **100** in place.

Because sleeve **130** is linked with strap **150** and strap **150** is linked to connector **180**, connector **180** is now secured to tool **100**. The user may then clip or attach a lanyard through opening **184** of connector **180** to prevent tool **110** from falling if it is dropped, therefore reinforcing safety on a job site. If connector **180** is not included, the user may separately add a connector to the assembly or the user alternately may clip a lanyard directly to closed loop **152** formed by strap **150**. Lanyard attachment assembly **100** further eliminates the need for workers to spend time retrieving dropped tools, which leads to increased worker productivity and reduced operating costs. Also, the closed loop **152** formed by strap **150** is stronger and more reliable than designs utilizing a leader strap held in place with heat shrink tubing.

Although the preferred embodiments of the present invention have been described herein, the above description is merely illustrative. Further modification of the invention herein disclosed will occur to those skilled in the respective arts and all such modifications are deemed to be within the scope of the invention as defined by the appended claims.

What is claimed is:

1. A lanyard attachment assembly for a hand tool comprising:

a strap made of a flexible material and defining a closed loop wherein the closed loop is flattened and defines an elongated first strap portion aligned with and opposing an elongated second strap portion, and wherein the elongated first strap portion is fixedly secured to the elongated second strap portion at one or more strap connection point to define a primary opening and one or more secondary opening through the closed loop between the elongated first strap portion and elongated second strap portion; and

a tubing having a predefined length, an inside surface and an outside surface, the inside surface defining a passageway through the tubing, the tubing being changeable between an expanded state and a relaxed state, wherein when a hand tool is installed in the passageway, an elasticity of the tubing causes the tubing to snugly engage the hand tool;

wherein the first strap portion along the primary opening passes through the passageway of the tubing, thereby linking the tubular sleeve to the strap; and wherein the secondary opening is adapted to connect to an end of a lanyard.

2. The assembly of claim **1**, further comprising at least one connector having a connector opening therethrough and installed through the one or more secondary opening and the at least one connector is adapted to connect to an end of a lanyard.

3. The assembly of claim **1**, wherein the tubing is heat shrink tubing.

4. The assembly of claim **3**, wherein the heat shrink tubing has a shrink ratio between about 2:1 and about 4:1.

5. The assembly of claim **1**, further comprising an adhesive disposed on the inside surface of the tubing.

6. The assembly of claim **5**, wherein the adhesive is heat activated.

7. The assembly of claim **2**, wherein the connector is selected from the group consisting of a D-ring, an O-ring, a carabiner, a shackle, split ring, a tri-loop, an open ring, a loop, a hook, a snap hook, a spring buckle, and a spring clip.

8. The assembly of claim **1**, wherein the strap is made of a material selected from the group consisting of nylon webbing, plastic, rubber, and combinations thereof.

9. The assembly of claim **1**, wherein the elongated first strap portion is fixedly secured to the elongated second strap portion at the one or more strap connection point by stiching.

10. The assembly of claim **1**, wherein the one or more secondary opening includes two secondary openings smaller than the primary opening and wherein the primary opening is positioned between the two secondary openings.

11. The assembly of claim **10**, further comprising an adhesive disposed on the inside surface of the tubing.

12. The assembly of claim **11**, wherein the adhesive is heat activated.

13. The assembly of claim **10**, further comprising a connector installed through each of the two secondary openings wherein each connector is selected from the group consisting of a D-ring, an O-ring, a carabiner, a shackle, split ring, a tri-loop, an open ring, a loop, a hook, a snap hook, a spring buckle, and a spring clip.

14. The assembly of claim **10**, wherein the strap is made of a material selected from the group consisting of nylon, plastic, rubber, and combinations thereof.

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